

# Modeling of Plasma Dynamics and EUV Generation for Distributed Sn Targets Irradiated with CO<sub>2</sub> Laser Pulses

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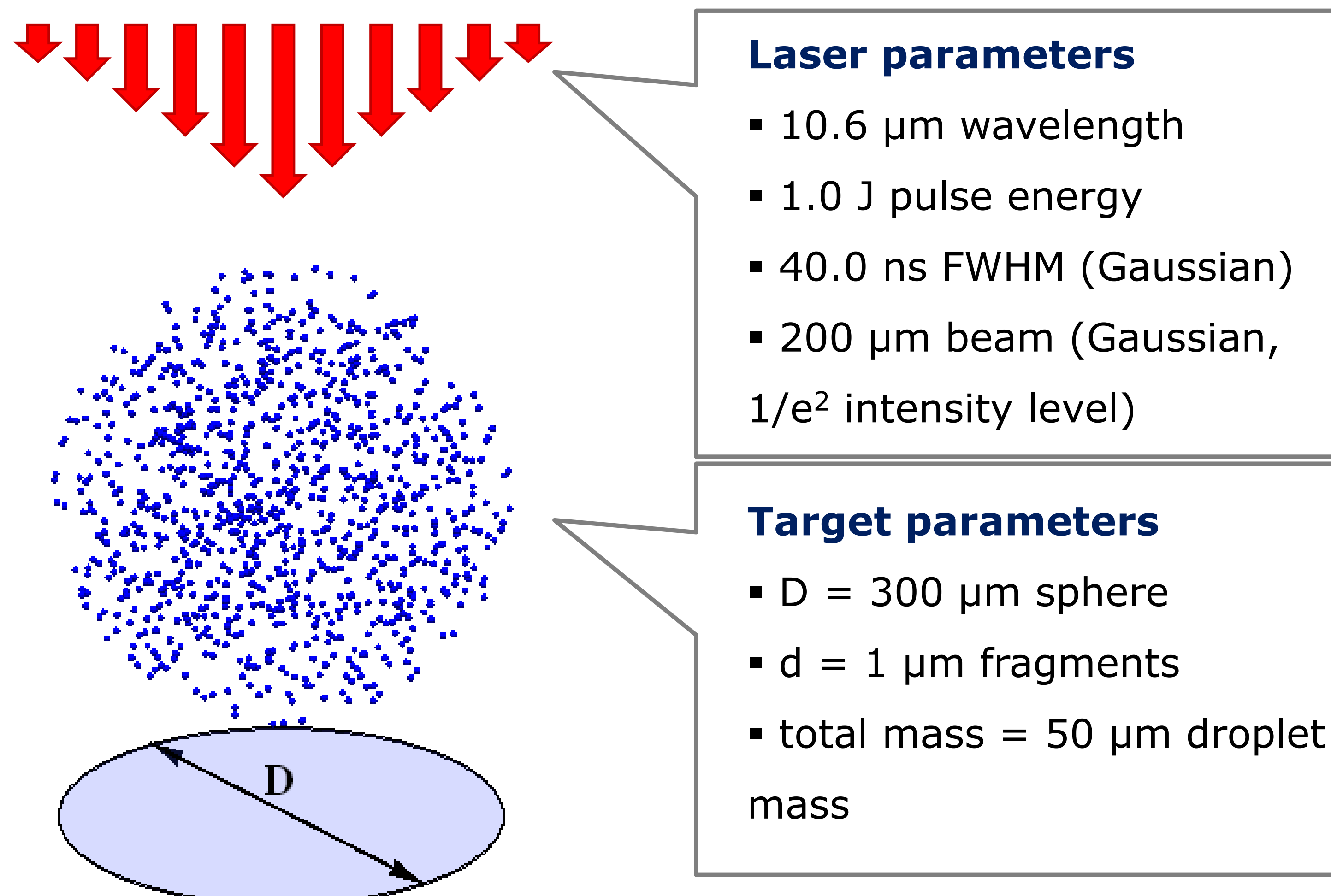
## INTRODUCTION

Effective coupling of laser radiation to plasma is essential for achieving high conversion efficiency (CE) of laser-produced plasma (LPP) sources of EUV radiation. On the way to the ideal LPP target it was proposed to use a cloud (mist) of very small droplets distributed over the volume with dimensions close to the beam spot diameter of the drive CO<sub>2</sub> laser. For preparation of mist targets pre-pulse irradiation is used.

We report on the modeling of EUV generation by LPP sources based on distributed targets – tin mist. RZLINE code is used for numerical calculations of radiative hydrodynamics. [1]

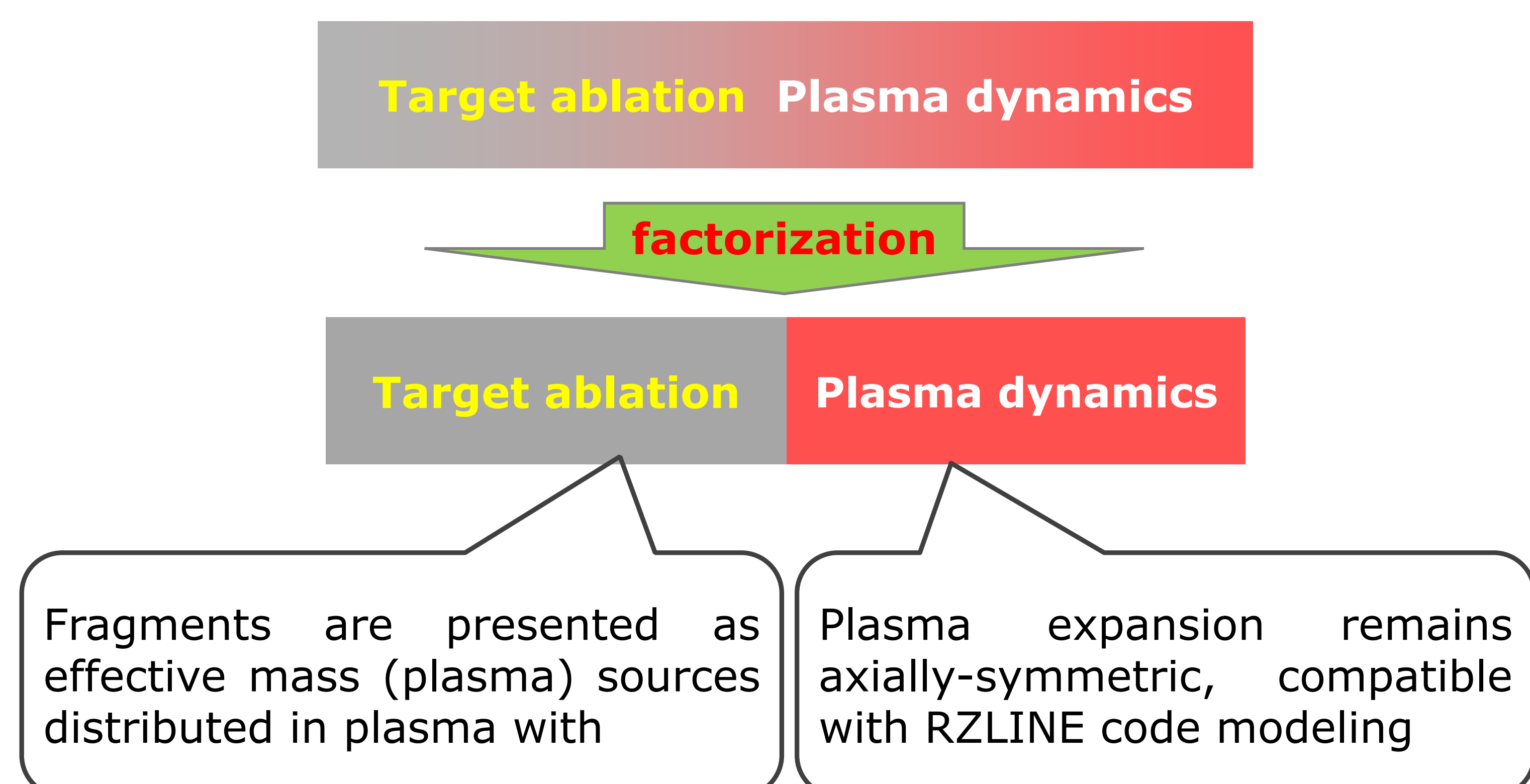
To demonstrate some important features of distributed targets (DT) we have chosen a simplified case — a spherical region homogeneously filled with tin fragments (microdroplets). For comparison we also modeled a tin single droplet (SD) target with the mass equal to that of DT.

## MODEL



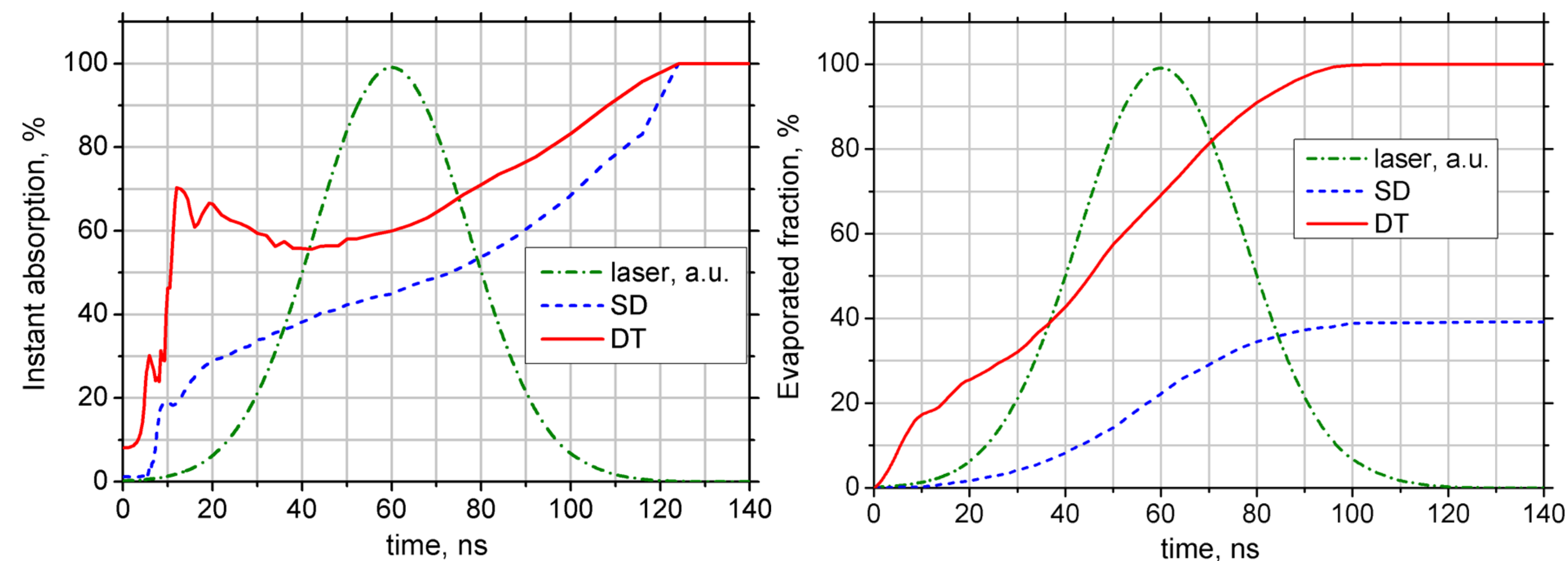
## 3D Target in 2D axially-symmetric RHD code

Processes of microdroplets ablation (evaporation) in plasma and plasma dynamics can be separated in the simulation procedure.

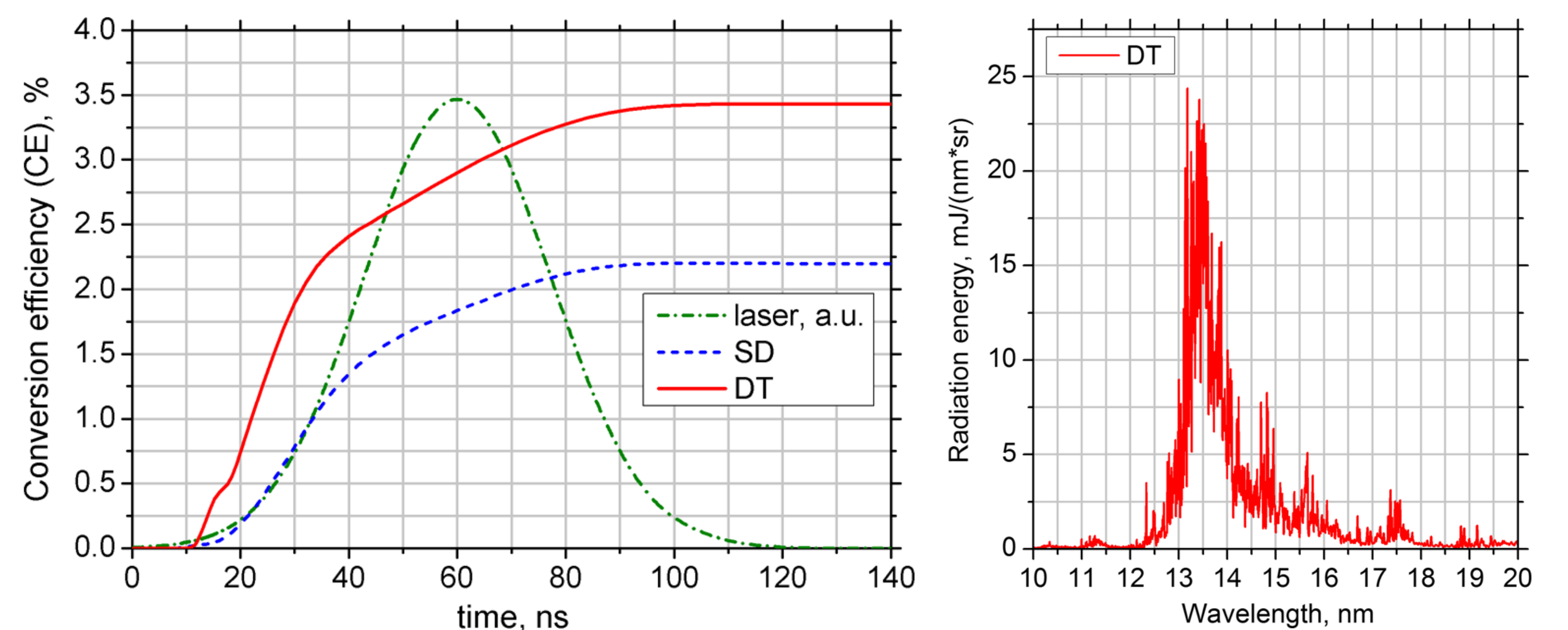


## RESULTS OF CALCULATIONS

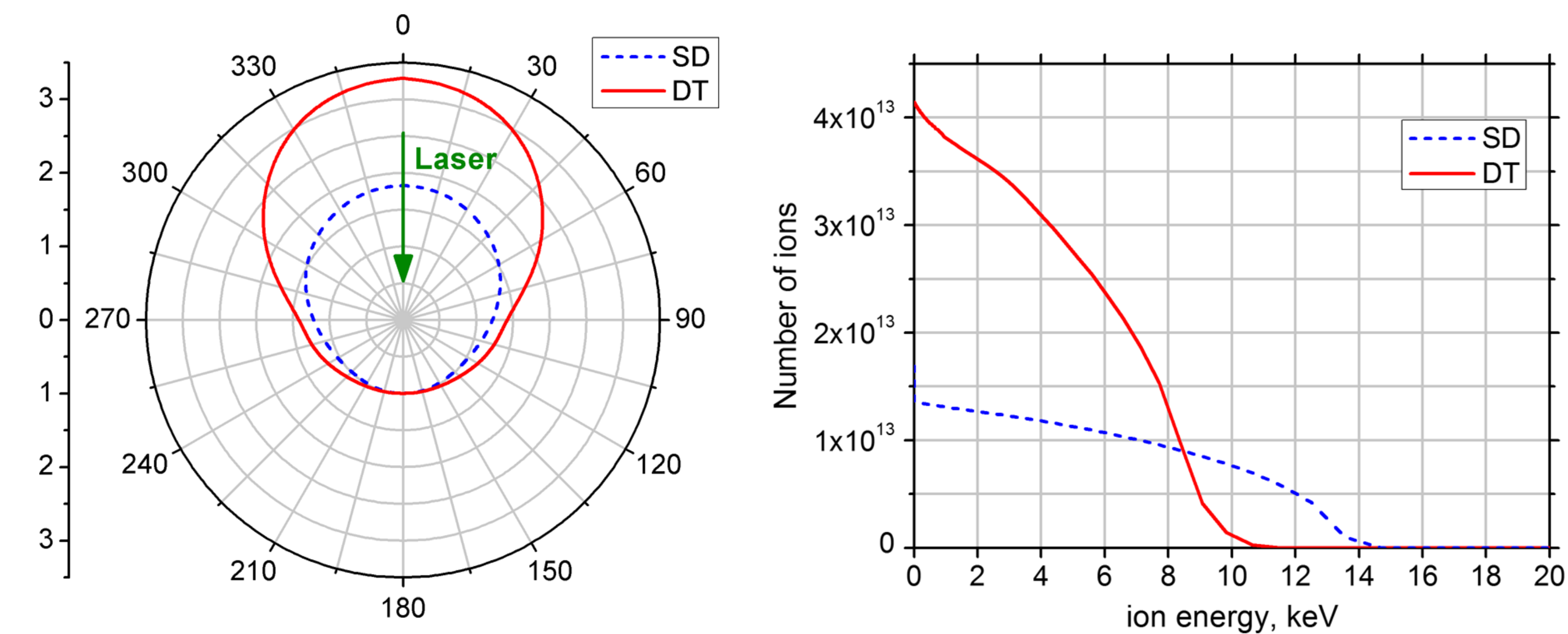
### Laser absorption and target evaporation rate



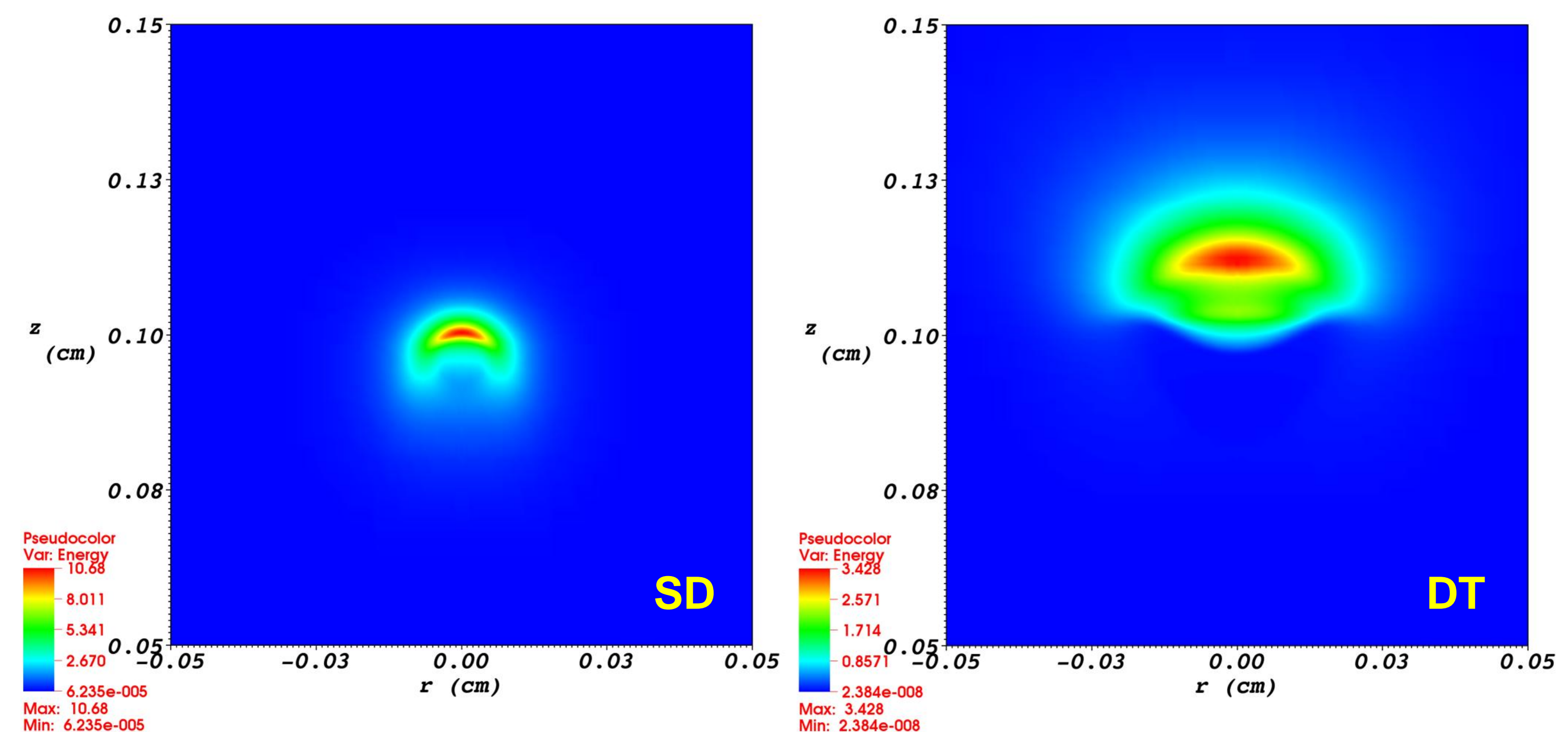
### In-band conversion efficiency and EUV emission spectra



### Anisotropy of EUV emission (left) and kinetic energy spectra of Sn ions (right)



### EUV source size



## References:

[1] K. Koshelev et al., *J. Micro/Nanolith. MEMS MOEMS*. 11(2), 021112 (May 21, 2012).

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